OBJECTIVES

A Distinguish between a fracture and a fault.

B Explain how dome mountains are different from folded mountains and describe two kinds of dome mountains.

IV Other Tectonic Features

Topic 10 Joints

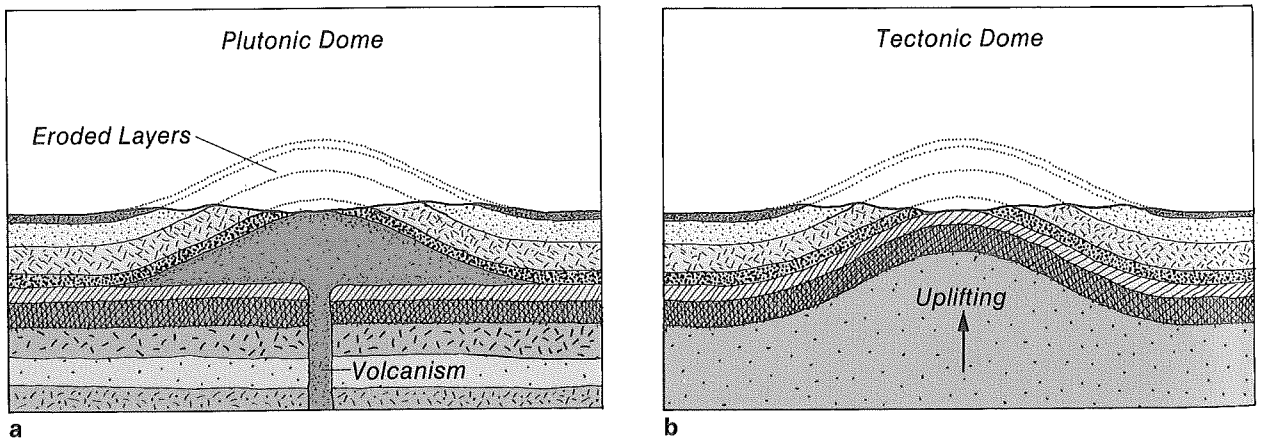
Joints are one of the most common rock structures. Like faults, joints are breaks in the bedrock. Unlike faults, joints do not involve motion. Therefore, a **joint** is a crack or break in the bedrock along which no apparent movement has occurred. Joints can be the result of the same stresses that lift, tilt, and fold rock layers into mountains.

The surface of a joint is usually a plane, although curved surfaces sometimes occur. The joint plane appears on the surface of a rock outcrop as a line. These lines can occur in parallel, evenly-spaced groups called *sets.* Often one joint set is crossed at an angle by another joint set.

In addition to their relationship to mountain building, joints provide channels for fluids to enter and move through bedrock. Hot fluids rising through the crust may fill a joint with quartz, calcite, or some other mineral to form a *vein deposit.* Caverns form when groundwater flows through and dissolves limestone along joint planes. In some areas, the land's surface features are controlled by joint patterns. The spectacular spires at Bryce Canyon in Utah are the result of weathering along joints.

Topic 11 Dome Mountains

A **dome mountain** is a nearly circular folded mountain. However, dome mountains have some fundamental differences from folded mountains like the Andes and the Appalachians. Dome mountains do not form mountain chains. Instead, these mountains are individual, isolated structures. Also, dome mountains are the result of uplifting forces. Folded mountains, on the other hand, are the result of the horizontal forces of plate collisions. The relationship of dome mountains to plate tectonics, if any, is not clear.



16.9 **(a)** The formation of a plutonic dome, **(b)** the formation of a tectonic dome

Dome mountains may occur in areas of essentially flat-lying sedimentary rocks. However, these layers may be bent sharply upward around the dome as a result of the uplifting forces that formed it. If erosion has removed the rocks over the center of the dome, the layers may stand out as sharp ridges around its edge. Dome mountains may be less than 10 kilometers to more than 180 kilometers across.

There are two basic kinds of dome mountains – plutonic and tectonic. *Plutonic* dome mountains are formed when overlying crustal rocks are pushed upward by the intrusion of an igneous mass, such as a laccolith. Because the intrusion occurred after the rocks were formed, the rocks of the exposed core of the mountain are younger than the sedimentary rocks around the core. An example of a plutonic dome mountain can be found in the Henry Mountains of Utah. Many other examples occur on the border of the Colorado Plateau and the Rocky Mountains.

Tectonic dome mountains are the result of uplifting forces that arched the rock layers upward. All of the rocks in the dome were present before the uplift occurred. The rocks at the core extend under the rocks around the dome and, therefore, must be older. Two excellent examples of tectonic domes are the Adirondack Mountains of New York State and the Black Hills of South Dakota. In both cases, the rocks in the core of the dome are older than the rocks around it.

TOPIC QUESTIONS

Each topic question refers to the topic of the same number.

10. **(a)** What is a joint? **(b)** Describe the pattern or patterns formed by joints in rock outcrops. **(c)** Identify three features or events that occur along joints.

11. **(a)** What is a dome mountain? **(b)** Name two ways in which dome mountains differ from folded mountains. **(c)** What may happen to the rock layers around a dome? **(d)** How do plutonic domes form? **(e)** What is the age of the rocks at the center of a plutonic dome compared to the rocks around the dome? **(f)** Give an example of a plutonic dome. **(g)** How do tectonic domes form? **(h)** What is the age of the rocks at the center of a tectonic dome compared to the rocks around the dome? **(i)** Give some examples of tectonic domes.

Map Skills

Refer to the map on pages 656–657 to answer these questions.

1. From this map, are the most extensive mountain ranges located on the land or underwater?

2. What type of feature forms the underwater mountain ranges?